TRANSLATION

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Machine for the production of filled and closed bags

The invention relates to a machine for the production of filled and closed bags from a foil band shaped into a tube.

The tube formed with the aid of a form shoulder (Formschulter) encloses in a known category of these machines a filling tube. The edges of the band overlapping here on the surface of the filling tube are then joined with one another by application of heat and/or pressure-transferring jaws, for example by welding, cementing, sealing or the like. The tube formed in this manner is then drawn off from the filling tube and, underneath the filling tube, squeezed together by means of jaws attacking from two sides on the tube, in which process at the squeezing places the oppositely lying tube walls are joined with one another, so that cross-closures are formed subdividing the tube into bags. After the formation of the first cross-closure there is filled in through the filling tube a portion of the filling material intended for a bag, so that after the formation of the next cross-closure this portion is located between two cross-closures. Thereupon, the bag is separated from the tube by a cut through the middle of the cross-closures.

in known machines of this type the foil is moved forward stepwise. This stepwise movement of the foil, especially in connection with the form shoulder, has the disadvantage that for a step a relatively large amount of time is required, since the movement was started gently.

There are also already known machines for the production of filled and closed bags from a foil band shaped into a tube, which are equipped with pressing and welding jaws arranged on at least one continuously revolving carrier for the subdividing of the tube into individual bags. The pressing and welding jaws cooperate there with corresponding counter-tools as well as with severing arrangements.

In these machines an automatic adaptation of the cross-closure places to present tube imprints during operation is not possible, nor is the production of bags of different length possible.

Underlying the present invention is the problem of excluding these disadvantages with the aid of devices which make it possible to carry out the above-described processes on a continuously running band. This problem is solved according to the invention by the means that the spacings of the pressing and welding jaws are adjustable stagelessly and without interruption in the manner that in a jaw carrier constructed in a known fashion as a wheel the individual jaws are arranged on radially adjustable tappets or

in the case of a carrier likewise constructed in a known manner in the form of a chain or of an endless band there is provided in each case a rod connecting the chain members with one another and guided in a bore of the other chain member, which rod is slidable against the force of a spring in the longitudinal direction of the chain. There it has proved expedient, for the adjusting of the jaw spacing or for the setting of the cut-off device to provide a common servo motor controllable in a known manner by a control arrangement scanning the markings of the foil.

The principle of the photoelectric control of processes in packing machines in dependence on markings on the foils to be processed is known per se. Thus, in an intermittently operating machine for the production of filled and closed bags there occurs a correction of the foil or tube advance in the manner that in the case of an insufficiently advanced foil piece, over a control arrangement equipped with a photoelectric cell the foil advance is readjusted so that the foil is still moved afterward by a certain amount. In the cases, however, in which the advanced foil piece is too large, the control arrangement does not go into operation. That is: a regulation of the advance is possible only in the sense that an additional piece of foil is fed in afterward.

The functioning of the arrangement according to the invention, in contrast, is a fundamentally different one. Here the adaptation of the cross-closure spacings on markings of the foil or of the tube occurs by automatic changing of the spacings of the pressing and welding tools, inclusive of a corresponding adjustment of the cutting device, and, namely, in both directions, i.e, regardless of whether the foil region bounded by two markings is larger or smaller.

As counter-support there can be provided a jaw carrier corresponding to the jaw carrier, or an endless band, a chain or the like. As long as the counter-support revolves with the jaws, the tube is squeezed at the places in which the jaws lie in contact, so that the connection is established. By adjustment of the revolution time of the jaws and by choice of a certain part of the carrier circumference at which the counter-support runs along with the jaws, the time that is required for the production of the cross-closures can be set at will, so that the closing of the bags by the production of the cross-closures is practicable on a band running continuously with a uniform speed.

Further features of the invention are given in the subclaims presented at the close of the specification.

In the following specification the invention is explained in detail with the aid of examples of execution represented in the drawings.

Fig. 1 shows a schematically simplified perspective front view of the filling part of an embodiment of the invention,

Fig. 2 a schematically simplified side view of the machine according to Fig. 1,

Fig. 3 a section through the drive and adjusting gear of the machine according to Figs. 1 and 2,

Fig. 4 a block circuit diagram of a control arrangement for the machine according to Figs. 1 to 3,

Fig. 5 a representing corresponding to Fig 2 of a modified example of execution,

Fig. 6 a selection along the line VI-VI in Fig. 5 on a larger scale,

Fig. 7 a section along the line VII-VII in Fig. 5

Fig. 8 a scheme of the drive for the jaw carrier of the machine according to Fig. 5,

Figs. 9 and 10 details for the explanation of the drive according to Fig. 8.

Description of the example of execution
according to Figs. 1 to 4

The example of execution represented in Figs. 1 to 4 consists essentially of a filling device 1, a wheel-form jaw carrier 2, a counter-support 3, a cutting-off device 4, a control device 5 (Fig. 4) and a drive- and adjusting gear 6 (Fig. 3.

The filling device 1 does not form the object of the invention. There can be provided, therefore, any arbitrary known filling device for the steady or charge-wise feeding of the filling material. Merely to facilitate understanding of the functioning of the whole machine, in Fig. 1 the filling device 1 is represented schematically simplified. This consists of an intermittently driven disk 1.1 to the underside of which there are fastened measuring containers 1.11 open toward both sides. Over the disk 1.1 there is fastened a filling funnel 1.2, which is filled with the material to be filled, for example with some food or refreshment. Here the funnel 1.2 is arranged in such a way that its lower opening stands during the standstill of the disk 1.1 exactly over in each case an opening 1.12 in the disk 1.1. Each opening 1.12 forms the upper orifice into the measuring container 1.11 so that through this latter during the standstill of the disk 1.1 the filling material is introduced into the corresponding measuring container 1.11.

At a distance under the disk 1.1 there is present a stationary disk 1.3 which closes off the lower openings of the measuring container 1.11. The plate 1.3 is provided in a place at which during the standstill of the disk 1.1 there is found a measuring cylinder, with an opening 1.31 upon which there follows a filling tube 1.32. The whole filling device 1 is carried by the machine casing 8.

The lower part of the filling tube 1.32 forms a part of a guide for a foil band 7 which is introduced into the machine wound on a roll 7.1, which is rotatably borne in the casing 8. In order to ensure a certain tension of the foil band 7, there is provided for the roll 7.1 a braking device which consists of a band 7.2 lying on the circumference of the roll 7.1 and weighted with a weight 7.21. Over deflecting rolls 7.31 and 7.32 the band is fed to a form shoulder 7.4 belonging to the known state of the art, by which the flat band fed to the form shoulder is laid about the lower end of the filling tube 1.32 in such a way that the edges of the band 7 overlap. In order to join these overlapping edges with one another there is provided a jaw constructed as roll 7.41, which is pressed by the force of a spring 7.42 onto the overlapping edges. In the example of execution represented the band 7 consists of a plastic weldable by application of pressure and heat. For this reason the roll 7.41 is provided with an electrical heating device (not shown in the drawing) of known type.

After the band now forming a tube 7' is drawn off from the filling tube 1.32, it is fed through the interspace between the wheel-form jaw carrier 2 and the counter-support 3 by two brush rollers 7.51 and 7.52 to the cutting-off device 4.

The jaw carrier called jaw wheel 2 in brief consists of a wheel hub 2.1 which is borne turnably, but axially unshiftably in the casing 8. In the hub 2.1 there are provided radially shiftable tappets 2.2, to the outer ends of which there are fastened electrically heatable welding jaws 2.21. The hub 2.1 is designed in bell form, and in its interior there is arranged an axially slidable adjusting cone 2.3 which is fastened to a hollow shaft 2.31. The hollow shaft 2.31 is not turnable with the hub 2.1, but iscconnected axially slidably by means of a spring 2.11 engaging into an axial groove 2.311. In the mantle surface of the adjusting cone 2.3 there is provided for each tappet 2.2 a groove 2.32 extending in an axial plane, into which groove there engages a roll 2.22 provided on the inner end of the tappet 2.2. By the force of a spring 2.24 abutting on a collar 2.23 of the tappet 2.2 each tappet 2.2 is pressed radially inward against the mantle surface of the adjusting cone 2.32.

The end of the hollow shaft 2.31 facing away from the adjusting cone 2.3 is rotatably, but not axially slidably connected with a part 2.4 which is provided with preferably two threaded bores

2.41. This connection is carried out in the represented example in the manner that the part 2.4 is provided with a hub 2.42, into which the hollow shaft 2.31 engages, and that on both sides of the hub 2.42 disks 2.43 are arranged, which are joined firmly with the shaft 2.31 by means of pins 2.44. Into the threaded bores 2.41 there engage threaded spindles 2.42 turnable in casing parts 8.12, but not axially slidably borne. To the end 2.451 of each threaded spindle projecting from the casing part 8.12 there is fastened in each case a gear wheel 6.11 and 6.12. These two gear wheels are joined with one another by a gear wheel 6.13.

For the drive of the jaw wheel 2 there is joined with this by means of a pin 6.21 a gear wheel 6.2 which meshes with a pinion 6.31 fastened to a drive shaft 6.3. The drive shaft 6.3 represented broken-off in Fig. 3, is driven at a constant rotational speed by a motor (not shown in the drawing). The shaft 6.3 is connected with the axial shaft 6.41 of a differential gear 6.4 over a gear or a chain. In Fig. 3 in the interest of simplicity for this connection there is represented a chain which a sprocket wheel 6.33 on the shaft 6.3 connects with a sprocket wheel 6.411 on the axial shaft 6.41.

Over the differential gear 6.4 the drive shaft 6.3 is connected with the cutting-off device 4. The casing 6.42 of the differential gear 6.4 is provided with a toothed rim 6.421 which meshes with a pinion 6.51 and with the gear wheel 6.12 of the geared spindle 2.45. The pinion 6.51 is connected over a gear (not shown in the drawing) with a servomotor 6.5.

When the servomotor 6.5 stops, then the casing 6.42 and therewith the threaded spindle 2.45 are held fast in a certain position. Here the rotation of the axial shaft 6.41 is transferred over the balancing cone wheels 6.44 onto the second axial shaft cone wheel 6.45, which is fastened to the one end of the second axial shaft 6.46 .

To the other end of the shaft 6.46 there is fastened a gear wheel 4.1, which meshes with a second gear wheel 4.2. The gear wheel 4.2 carries a knife 4.3, which cooperates with a fixed counter-knife 4.31. During each revolution of the gear wheel 4.2 the tube 7' formed from the foil band 7, coming from the jaw wheel 7 is severed. The translations of the drive gear 6 are chosen in such a way that the gear wheel 4.2 always executes a whole revolutio n when the gear wheel 2 has turned through the angular spacing between two jaws 2.21.

The counter-support for the pressing of the tube 7' onto the jaws 2.21 consists of an endless band 3.1 which is deflected about a deflecting roll 3.2 borne on a casing-fast axle 3.21 and two rolls 3.3 and 3.4 borne on slidable axles 3.33 and 3.47, respectively. The band 3.1 lies over a part of the circumference of the jaw wheel 2 on the jaws 2.21. So that the bearing of the band occurs with a certain pressure, the roll 3.3 is borne in a fork 3.31 which is slidable against the force of a spring 3.32. By the force of the spring 3.32 the band 3.1 is tensioned so that

it always rests on the jaws 2.21 with a certain pressure. The roll 3.4 is borne in the arm 3.42 of an angle lever, the second arm 3.43 of which bears with a roll 3.44 on a revolving cam 3.45. On this cam the roll 3.44 is pressed by means of the force of a spring 3.46. The cam 3.45, only partially represented in Fig. 2, is arranged on a shaft (not shown in the drawing), which is driven by the drive shaft 6.3 over a gear (likewise not represented in the drawing) so that it always turns once about its shaft in the time in which the jaw wheel turns through the angle spacing between two jaws 2.21. Here, the phase of the movement of the cam 3.45 with respect to the movement of the jaws 2.21 and of the disk 1.1 of the filling device is attuned in such a way that the roll 3.4 in the position of the jaws 2.21 represented in Fig. 2 is in its position lying next to the jaw wheel and that in this time the the disk 1.1 just moves. During the standstill of the disk 1.1, however, the roll 3.4 is in its position most remote from the jaw wheel 2. Thereby it is achieved that when a new jaw 2.21 just touches the tube 7', the tube is pressed by the roll 3.4 onto the jaw and in this time no filling material is filled into the tube.

In the time, however, in which the disk 1.1 stands still and the filling material is filled into the tube 7', the upper part of the band 3.1 is lifted off from the tube 7', so that the tube opening is as large as possible, so that the filling material can fall unimpeded to the cross-closure 7.6 formed by the welding of the tube at the contact place with uppermost jaw 2.21 lying against

the tube.

In order to achieve an altogether secure welding of the tube in the cross-closures 7.6, for the additional pressing of the band 3.1 onto a jaw 2.21 a counter-jaw 3.5 is provided, which is fastened with an arm 3.51 to a revolving shaft 3.52. The rotational speed of the shaft 3.52 is as many times greater than the rotational speed of the jaw wheel 2 as there are provided jaws 2.21 on the jaw wheel 2, so that the jaw 3.5 revolves once about its shaft 3.52 in the time in which the jaw wheel 2 turns through the angular spacing between two jaws 2.21. Preferably the jaw 3.5 is slidable against the force of the spring toward the shaft 3.52.

If the foil band 7 is printed, then it must be heeded that the cross-closures 7.6 lie exactly between the printed areas. In order here to make possible an automatic regulation, a control device 5 (Fig. 4) is provided. The control device 5 consists of an electro-optical scanning arrangement 5.1 which contains a light source 5.11, the light of which is relfected from the foil band 7 onto a photoelectric cell 5.12. On the foil band 7 there are provided markings 7.7 registerable by the photoelectric cell. As soon as the light reflected from such a marking 7.7 strikes the photoelectric cell 5.12, the scanning arrangement 5.1 brings about an electrical impulse which is fed over a converter 5.2 to a comparison stage 5.3.

Further there is provided a cam disk 5.4 coupled with the jaw wheel 2, the cam 5.41 of which closes an electric key (or sensing) switch 5.42 and thereby likewise briefly generates an impulse. The cam disk 5.4 is coupled here over a gear (not shown in the drawing) with the jaw wheel 2, so that its rotational speed is as many time greater than the rotational speed of the wheel 2, as the wheel 2 has jaws 2.21. The phase of the revolution movement of the cam 5.4 is chosen there in such a way that the impulse generated by the cam 5.41 is then generated at the same time with the impulse caused by the photoelectric cell 5.12 if the position of the band 7 is correct with respect to the jaws 2.21. The impulse brought about by the switch 5.42 is likewise fed over a converter 5.5 to the comparison stage 5.3. If both impulses arrive simultaneously, then no impulse is caused by the comparison stage. If, however, for any reason, the spacing between the markings 7.7 is somewhat greater or less than the spacing between the jaws 2.21, then the impulse caused by the photoelectric cell 5.12 arrives somewhat later or earlier than the impulse generated by the switch 5.42 in the comparison stage 5.3. By this non-simultaneous arrival of the impulses there is caused a current impulse in the comparison stage 5.3, the flow direction of which depends on whether the impulse coming from the photoelectric cell has arrived earlier or later than the other impulse at the comparison stage. The output of the comparison stage 5.3 is connected over an amplifier 5.6 with the servomotor 6.5, which according to the flow direction of the impulse caused by the comparison stage 5.3 is driven either in the one or the other direction for the duration of the impulse. By

the revolving of the servomotor 6.5 the casing 6.42 of the differential gear 6.5 and the threaded spindles 2.45 are turned through a certain distance. By the rotation of the spindles 2.45 the adjusting cone 2.3 is axially shifted, so that thereby the jaws 2.21 are radially adjusted. Through this radial adjustment of the jaws 2.21 their distance apart changes. This spacing alteration proceeds until the synchronization of the impulses in the control device is again achieved. By the adjustment of the casing 6.42 of the differential gear 6.4 the phase of rotation of the knife 4.3 is adjusted in such a way that the knife 4.3 makes the cut exactly in the middle of the cross-closure 7.6.

In Fig. 4 an alernative solution for the adjustment of the adjusting cone and of the knife is represented in broken lines. According to this the impulses are fed from the comparison stage 5.3 over the amplifier 5.6 to an electromagnetic coupling 5.7 for two turning directions, which according to the direction of the impulse couples the steadily revolving servomotor with the gear wheel 6.51 for the revolution of the same in the one or in the other rotational direction.

For the heating of the jaws 2.21 electrical heating bodies 2.25 are provided in these, which are connected by means of lines 2.26 led through the hollow shaft 2.31 with slip rings 2.5 arranged beside the part 2.4 on the shaft 2.31. The slip rings 2.5 are connected by brushes 2.51 over lines 2.52 and a switch 2.53 with a current source 2.54. A similar electrical heating over slip rings (not shown in the drawing) is provided for the roll 7.41.

Functioning of the example of execution according to Figs. 1 to 4

in order to fill a filling material, for example a bulk material, such as sugar, candies or the like, into a bag produced from a foil band 7, the foil band 2 is first placed in the interspace formed by the rolls 7.31, 7.32, the form shoulder 7.4 between the jaw wheel 2 and the supporting band 3.1 and the brush rollers 7.51 and 7.52 in such a way that the band after the shoulder 7.4 forms a tube enclosing the lower part of the filling tube 1.32, pressed by the supporting band 3.1 onto a part of the jaws 2.21. Simultaneously the drive of the machine is set in operation, so that the jaw wheel 2, the brush rollers 7.51 and 7.52 and the counter-jaw 3.5 revolve in the direction of the arrows a or b or c. Thereby, the band 7 is drawn off at a uniform speed from the roll 7.1 and fed to the interspace between the supporting band 3.1 and the jaws 2.21. Before the setting in operation of the machine, the heating units of the jaws 2.21 and of the roll 7.41 are switched on, and the funnel 1.2 of the filling device 1 is filled with the filling material. With the switching-on of the drive of the machine there run simultaneously with the jaw wheel 2 also the disk 1.1 and the cams 3.45 and 5.41. In the revolution of the disk 1.1 the measuring containers 1.11 are filled with the filling material.

As soon as a filled measuring container 1.11 comes to a stop over the opening 1.3, the filling material falls through the filling funnel 1.32 into the tube 7'. Since at this time the roll 3.4 occupies its position most remote from the jaw wheel 2, the filling material falls to the place at which the in each case uppermost jaw 2.21 presses the tube 7' against the supporting band 3.1 and welds the two oppositely lying walls of the tube, forming a cross-closure 7.6. As soon as the charge of the bulk material present in the measuring container 1.11 has collected over this uppermost cross-closure 7.6, the disk 1.1 moves one step onward. Simultaneously the roll 3.4 approaches the next jaw 2.21 and thereby , by means of the supporting band 3.1, presses the tube 7' onto this jaw, so that there takes place a new welding of the oppositely lying walls of the tube 7' into a new cross-closure 7.6. By this new cross-closure the charge of the bulk material that has run out of the measuring container 1.11 is enclosed in a bag 7.7 closed on all sides. The jaw wheel 2 rotates so rapidly that, while the tube is being compressed between a jaw 2.21 and the supporting band 3.1, a complete welding takes place. In order to ensure an altogether secure welding, the band 3.1 is still pressed by means of the countersupport 3.5 especially strongly against the jaw 2.21.

By the brush rollers 7.51 and 7.52 the series of bags 7.7 formed from the tube is fed to the cutting-off device 4, where

the knives 4.3 and 4.31 by a cut exactly in the middle of the cross-closure 7.6 in each case cut off a bag 7.7 from the adjacent one. By the above-described control device 5 it is always provided there that the spacing of the jaws 2.21 corresponds to the lettering of the foil band 7 and the knives 4.3 and 4.31 execute the cut always in the middle of the cross-closure 7.6.

Description of the example of execution according to Figs. 5 to 10

This example of execution differs from the preceding by another jaw carrier and another cutting-off device. The filling device 1, the guidance of the foil band 7 and the control device 5 correspond essentially to the corresponding devices of the embodiment according to Figs. 1 to 4, so that a detailed explanation of these parts of the machine is unnecessary.

As jaw carriers in this example of execution there are provided two chains completely alike designated as a whole with 9. In the following, therefore, only one of these chains is described in detail. The chain consists of ten chain members 9.1. Every two adjacent chain members are joined with one another by means of a rod 9.2, one end of which is pivotable about an axle 9.21 with the one member and the other end of which is axially slidable against the force of a spring in a bore 9.22 of the other chain member. The force of the spring 9.23

is directed there in such a way that it tends to draw the adjacent chain members onto one another. Each chain member 9.1 forms a plate 9.12 perpendicular to the drawing plane in Fig. 5, which is covered with a foam rubber layer 9.13.

over the end carrying the axle 9.21 of each chain member 9.1 there is provided a carrier 9.14 for two welding jaws 9.3 parallel to one another and perpendicular to the direction of movement of the chain and a knife 9.4 lying between these jaws, parallel to these.

The knife 9.4 is slidable in a slot 9.15 of the carrier 9.14 perpendicularly to the direction of movement of the chain and is provided with bars 9.42 carrying at their ends rolls 9.41. By the force of springs 9.43 the knife is held in its lowest position represented in Fig. 6, in which its edge 9.43 is retracted behind the surface 9.31 of the jaws 9.3.

On the side of the carrier 9.14 facing the space enclosed by the chain there are likewise provided rolls 9.16. Both the rolls 9.16 as well as the rolls 9.41 serve to press the jaws 9.3 or the knife 9.4 by means of rails 9.31 and 9.44 fastend in the machine casing against the tube 7'.

For the drive of the chain 9 there are provided two deflecting wheels 9.5, entirely like one another, which by means of arms 9.51 grasp the chain members 9.1 on the axle 9.21. For this purpose each arm 9.51 is provided with a forked end 9.52.

The deflecting wheels 9.5 for the two chains 9 are borne in the machine casing 10 in such a way that as long as the rolls 9.16 have not run onto the rail 9.31, the surfaces of the foam rubber layer 9.13 and the jaws 9.3 are at a distance from one another. As soon as the rolls 9.16 encounter the rail 9.31 the carriers 9.14 of the chain members 9.1 lying directly opposite one another are pressed together, so that the tube 7' is compressed between the jaws 9.3 of the oppositely lying chain members 9.1 of the two chains. As long as the rail 9.4 is not conducted correspondingly close to the chain members, the edge 9.43 of the knife 9.4 does not go into action. Only in the lower region of the rail 9.4 does this bring the knife 9.4 so high that the oppositely lying edges 9.43 of the oppositely lying chain members 9.1 of the two chains cut through the tube between the two jaws 9.3.

The deflecting wheels 9.5 are fastened to shafts 9.53 and 9.54 (Fig. 8 rotatably borne in the casing, which (shafts) are driven over conical gear wheels and over a shaft 9.55, which in turn is driven over an antiparallel crank 9.6 by a drive motor 9.61. Here in each case the corresponding, in Fig. 5 lower, shafts 9.54 of the two chains are driven simultaneously from the same shaft 9.5 in opposite turning direction. The drive shaft 9.54 of each chain is connected by means of a shaft 9.56 with the axial shaft of a differential gear 9.7, the second axial shaft of which is connected by means of a shaft 9.57 with the shaft 9.53 of the second deflecting wheel 9.5. The casing 9.71 of the differential

gear 9.7 is provided with a toothed rim 9.72 which meshes with a a gear rack 9.73. The gear rack 9.73 connects the two casings 9.71 of the differential gear 9.7 in the drives of the two chains 9. The one toothed rim 9.72 of the one differential gear 9.7 meshes here with the pinion 9.75 of a servomotor 9.74 corresponding to servomoto: 6.5 of the earlier-described example of execution.

The antiparallel crank 9.6 consists in a known manner of two disks 9.62 and 9.63 which are rotatable about two axes 9.64 and 9.65 offset against one another. The two disks 9.62 and 9.63 are connected with one another by means of a lash plate 9.66, one end of which about an axle 9.67 is connected with the disk 9.62 and the other end of which is connected about an axle 9.68 with the disk 9.63. The antiparallel crank 9.6 serves to transform the uniform revolution of the drive motor 9.61 into a non-uniform revolution of the shaft 9.64 and therewith of the shafts 9.53 and 9.54 in order to ensure a uniform forward-movement speed of the chain members 9.1, which otherwise, in consequence of the drive by means of the arms 9.51 move fas in the position of the wheels 9.5 shown in Fig. 5 and slowest in a position turned thereto through 45°. The decrease of the speed in the 45° position mentioned is compensated by an increase of the rotary speed of the shaft 9.64 thanks to the antiparallel crank 9.6. In Fig. 10 there is represented the increase of turning speed of the shafts 9.54 and 9.53 attainable by use of the antiparallel crank in the 45° intermediate position, as this speed increase $\Delta\omega$ is plotted over the turning angle α of the shafts 9.53 and 9.54, respectively. Instead of an antiparallel crank there can, of course, also be

elliptical gear wheels by which a still more exact compensation is made possible.

For the heating of the jaws 9.3 electric heating bodies are provided in these which are connected by means of lines 9.33 with brushes 9.34 which rest on current-feed rails 9.35 which are connected with a current source (not shown in the drawing).

Functioning of the example of execution according to Figs. 5 to 10

During the revolution of the drive motor 9.61, as a rule the servomotor 9.74 is at a standstill, so that the two shafts 9.53 and 9.54 of each chain 9 revolve at the same speed. The directions of revolution of the shafts 9.53 and 9.54 are given in Fig. 8 by arrows d. In correspondence to these directions of revoluttion also the chains 9 turn in the direction of the arrows designated with e. In the regions in which the chain members 9.1 of the two chains 9 face each other, the rolls 9.16 run up onto the rails 9.31, so that the tube 7' is squeezed between the chain members 9.1 of the two chains and thereby the tube walls lying opposite one another are welded or cemented together. In the further movement of the chain members the knives are brought near to one another by the running of the rolls 9.41 onto the rail 9.44 and finally by the impinging of the two edges 9.43 on one another the tube is severed between the cross-closures formed by the jaws

9.3, so that underneath the chain there fall out fully closed bags, separated from one another. The foam rubber cushions 9.13 serve here to support the tube 7' laterally.

The control arrangement corresponds essentially to the control arrangement represented in Fig. 4 of the previously described example of execution. As soon as the servomotor 9.74 is set in operation the casings 9.71 and 9.72 are adjusted so that thereby the angular position between the two axles 9.53 and 9.54 of each chain are altered. This alternation of the angular position brings it about that the spacing of the chain members in a stringer in a each case of the chain changes, which simultaneously has the result that also the spacing between the welding jaws 9.3 and the knives 9.4 changes.

PATENT CLAIMS:

1. Machine for the production of filled and closed bags from a foil band shaped in a tube with pressing and welding jaws mounted on at least one continuously circulating carrier as well as cooperating with corresponding counter-tools as well as with severing arrangements for the subdividing of the tube into individual bags, characterized in that, for the production of different bag

lengths or for the adapting of the cross-closure spacings to tube imprints that are present, the spacings of the pressing and welding jaws (2.21, 9.3) are adjustable stagelessly and without interruption of the machine running, in the manner that in a jaw carrier designed in a known manner as a wheel (2) the individual jaws are arranged on radially adjustable tappets (2.2) or in the case of a carrier designed likewise in a known manner in the form of a chain (9) or of an endless band there is provided in each case a rod (9.2) joining the chain members (9.1) with one another and guided in a bore (9.22) of the other chain member, which is slidable in longitudinal direction of the chain against the force of a spring (9.23).

2. Machine according to claim 1, characterized in that in the wheel hub (2.1) of the carrier (2) there is provided an axially shiftable adjusting cone (2.3) for the tappets (2.2).

3. Machine according to claim 2, characterized in that at least one spring (2.24) is provided which presses the tappets (2.2) radially inward against the mantle surface of the adjusting cone (2.3).

4. Machine according to claims 1 to 3, characterized in that for the adjusting of the jaw spacing or for the setting of the cutting-off device there is provided a common controllable servomotor (6.5, 9.74) controllable in a known manner by a control arrangement scanning the markings of the foil.

5. Machine according to claims 1 to 4, characterized in that the servomotor (6.5) is connected over a gear (6.51, 6.421) with the casing (6.42) of a differential gear (6.4) connecting the jaw wheel (2) with a revolving cutting-off arrangement (4) and an adjusting spindle (2.45) for the adjusting cone (2.3).

6. Machine according to claims 1 and 4, characterized in that the deflecting wheels (9.5) of the chain (9) for the adjusting of the jaw spacing are connected by a differential gear (9.7) the casing (9.7) of which is adjustable by the servomotor (9.74).

7. Machine according to claim 6, characterized in that the deflecting wheels (.5) engage by means of arms (9.51) on the chain (9) and are connected with the drive shaft (9.65) over a gear, preferably an antiparallel crank (9.6), which ensures a constant speed of the chain members (9.1).

8. Machine according to claim 7, characterized in that as counter-support there is provided an endless band (3.1) and for the deflecting of this band shortly before the contact zone of the band with the jaws (2.21) there serves a pivotably borne deflecting roll (3.4).

9. Machine according to claim 8, characterized in that for the pivotable deflecting roll (3,4) a pendulating drive (3.45, 3.43) is provided.

10. Machine according to claims 7 to 9, characterized in that for the supplementary pressing of the band (3.1) onto a jaw (2.21) there is provided at least one revolving counter-jaw (3.5).

11. Machine according to claims 6 and 7, characterized in that each chain member (9.1) is provided with a cushion (9.13) engaging on the bag side walls.

Publications taken into consideration:

German patent specifications 846,376, 968,930, 1,010,445, 1,060,585;

Austrian patent specification 194,426;

USA patents 2,134,862, 2,636,732, 2,759,308.